

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:-

1. A method for separating a sample into components by two-dimensional electrophoresis, said method comprising:
  - a. providing a first electrophoretic separation medium comprising an elongate strip, and a second electrophoretic separation medium, said media being spaced apart and carried on a single support means;
  - b. with the planar support means oriented in a generally vertical plane and the first electrophoretic separation medium oriented in a horizontal plane spaced above or below the second electrophoretic separation medium by a gap, carrying out a first dimension separation of a sample mixture in the first electrophoretic separation medium, while the first and second media are separated by a non-electrically conducting liquid which is substantially immiscible with, and non-extractive of, water;
  - c. after the first separation has been carried out, tilting the support means so that the first electrophoretic separation medium is at an angle to the horizontal and flushing the liquid out from the gap between the first electrophoretic separation medium and the second electrophoretic separation medium; and
  - d. flowing a liquid buffer containing bridging material into the gap to allow transfer of sample molecules from the first electrophoretic separation medium to the second electrophoretic separation medium under the influence of an electric field.
2. A method as claimed in claim 1 wherein the first electrophoretic separation medium is at least partly enclosed by a removable metal foil cover which allows the medium to be rehydrated, using a liquid containing the sample to be separated, while the support means is in the vertical orientation.
3. A method as claimed in claims 1 or 2 wherein the non-electrically conducting liquid is paraffin oil.
4. A method as claimed in any preceding claim wherein the first electrophoretic separation medium comprises an IPG strip.
5. A method as claimed in any preceding claim wherein the second electrophoretic separation medium comprises a gel slab.
6. A method as claimed in any preceding claim wherein the support means comprises a generally planar support.
7. A method as claimed in any preceding claim wherein the liquid buffer containing bridging material comprises agarose gel containing a buffer.
8. Apparatus for carrying out a separating a sample into components by two-dimensional electrophoresis, said apparatus comprising:
  - a first electrophoretic separation medium comprising an elongate strip;

a second electrophoretic separation medium, both said media being spaced apart and carried on a single generally planar support means; and

a cover means comprising a thin film which in conjunction with the planar support means encloses the elongate strip.

9. Apparatus as claimed in claim 8 wherein the thin film comprising the cover means is electrically conductive.
10. Apparatus as claimed in claim 9 wherein the thin film comprising the cover means comprises a metal foil.
11. Apparatus as claimed in claim 8 wherein the media are spaced apart by a gap of from 1 to 4mm.
12. Apparatus as claimed in claim 8 or 9 wherein the solid support forms part of a cassette having a front wall, a rear wall and opposed side walls and wherein ends of the strip are separated from the adjacent side walls of the cassette by a gap of about 5mm.
13. Apparatus as claimed in claim 12 wherein the cassette defines widened electrode bridge portions adjacent the ends of the strip.
14. A two dimensional electrophoresis gel cassette comprising:
  - a cassette shell having a planar support surface;
  - a first electrophoretic separation medium comprising an elongate strip supported on the planar support surface;
  - a second electrophoretic separation medium comprising a slab supported on the planar surface; and
  - a removable thin film cover which, in conjunction with the planar support surface of the cassette shell, encloses the first medium;
 the cassette shell defining a fluid retaining space between the first and second mediums.
15. The cassette according to claim 14 wherein the first medium is in a dehydrated state, and wherein the removable thin film cover is openable to form an open fluid retaining space around the first medium for rehydrating the first medium.
16. The cassette according to claim 14 wherein the removable thin-film cover is opens to form a fluid retaining space when the planar support is in a generally vertical orientation.
17. The cassette according to claim 14 wherein the removable thin film is electrically conductive.
18. The cassette according to claim 14 wherein the removable thin film cover comprises a metal foil.
19. The cassette according to claim 14 wherein the removable thin film cover comprises an electrically conductive plastic foil.

20. A two dimensional electrophoresis gel cassette comprising:  
 a cassette shell having a planar support surface;  
 a first electrophoretic separation medium comprising an elongate strip supported on the planar support surface;  
 a second electrophoretic separation medium comprising a slab supported on the planar surface; and  
 a removable thin film cover which, in conjunction with the planar support surface of the cassette shell, encloses the first medium;  
 the cassette shell defining a fluid retaining space between the first and second mediums;  
 in which the cover has been removed and a non-electrically conducting liquid is disposed in the fluid retaining space between the first and second medium so that the first medium can be used to conduct an electrophoretic separation.
21. A two dimensional electrophoresis gel cassette comprising:  
 a cassette shell having a planar support surface;  
 a first electrophoretic separation medium comprising an elongate strip supported on the planar support surface;  
 a second electrophoretic separation medium comprising a slab supported on the planar surface; and  
 a removable thin film cover which, in conjunction with the planar support surface of the cassette shell, encloses the first medium;  
 the cassette shell defining a fluid retaining space between the first and second mediums;  
 in which the cover has been removed and the first medium used for a first electrophoretic separation, and a bridging material is disposed in the fluid retaining space between the first and second mediums so that the second medium can be used for electrophoretic separation of the materials electrophoretically separated in the first medium.
22. A method of separating a sample into components by two dimensional electrophoresis using a cassette comprising a shell having a planar support surface, a first electrophoretic separation medium comprising an elongate strip supported on the planar support surface; a second electrophoretic separation medium comprising a slab supported on the planar surface; and a removable thin film cover which, in conjunction with the planar support surface of the cassette shell, encloses the first medium, the method comprising:

removing the cover, introducing the sample into the first medium, introducing a non-electrically conducting fluid between the first and second mediums;  
conducting a first electrophoretic separation using the first medium;  
replacing the non-electrically conducting fluid with a bridging material;  
conducting a second electrophoretic separation of the material separated in the first electrophoretic separation, using a second medium.

23. The method according to claim 22 wherein the first medium is initially provided in a dehydrated state, and further comprising the step of opening the cover to form a space surrounding the chamber capable of holding a fluid, and introducing fluid in the space for rehydrating the first medium.

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